PRACTICAL FARMERS OF IOWA
COOPERATORS' PROGRAM Farmer-Led Research

EXPERIMENT

2021
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Oat Variety Trial 2021

In a Nutshell:

- 18 oat varieties were screened at four Iowa State University research farms.

Key Findings:

- Across varieties and sites, average oat yield was 116 bu/ac.
- Streaker (hulless variety) scored a test weight >40 lb/bu at each location; though, it was also the lowest yielding variety at each location. Sumo and Shelby 427 (hulled varieties) made food grade test weight specifications at two of the four research farms.

Oat variety trial at Boone on July 2, 2021.

Cooperators

ISU Northern Research Farm – Kanawha (Matt Schnabel)
ISU Ag Engineering and Agronomy Farm – Boone (Matt Schnabel)
ISU Northeast Research Farm – Nashua (Ken Pecinovsky)
ISU Southwest Research Farm – Greenfield (Matt Schnabel)

Funding

Walton Family Foundation, Albert Lea Seed House, General Mills, Welter Seed and Honey Co., Meridian Seeds, Sponheim Seed, SDSU Seed Foundation, Zabel Seeds

BACKGROUND

Careful management and proper choice of variety can make oats a profitable crop due to their low input requirements and beneficial effects on succeeding crops in a rotation. Oats can be used for grain and straw production, as a companion crop to establish hay and pastures, or for early-season forage as hay or haylage. Because oats are harvested in late July to early August, field management options for the remainder of the season are numerous. These include establishment of a perennial forage or summer cover crop, as well as an opportunity for mid-season manure application. Planting oats before April 15 is recommended for optimal yields in Iowa. This helps avoid exposure to warmer weather during grain fill. Test weight is the most commonly used indicator of grain quality. High test-weight varieties should be chosen by growers who intend to market oat grain to food-grade buyers. Oat growth is regularly affected by rust and barley yellow dwarf virus. Variety resistance to these diseases should be considered. Another option is the use of a foliar fungicide applied at Feekes 9 growth stage, defined as flag leaf emerged with ligule visible.

In 2021, 180,000 acres of oats were planted in Iowa according to the USDA-National Agricultural Statistics Service. The state average yield for the year was 77 bu/ac; the five-year average yield is 71 bu/ac.[1]

METHODS

Variety trials were conducted at four locations in 2021: ISU Northern Research Farm in Kanawha; ISU Ag Engineering and Agronomy Farm in Boone; ISU Northeast Research Farm in Nashua; ISU Southwest Research Farm in Greenfield. These variety trials build on previous trials conducted at Kanawha, Charles City, Boone, Nashua and Lewis from 2015¬–2020.[2–7] Information about each of the varieties trialed in 2021 can be found in **Table 1**.

TABLE 1. Origin, PVP and disease ratings for oat varieties screened in 2021.

VARIETY	ORIGIN[a]	YEAR RELEASED	PVP[b]	MATURITY	DISEASE RATINGS[c]			
					CROWN RUST	STEM RUST	BYDV[d]	SMUT
Antigo	WI	2017	PVP	Early	MR	S	MR	MR
CS Camden	SW	2013	PVP	Medium	MS	S	--	MR
Deon	MN	2014	PVP	Late	MR	MS	MR	R
Esker 2020	WI	2020	PVP	Medium	MR	MR	MR	R
Goliath	SD	2013	PVP	Late	MS	R	MR	MR
Hayden	SD	2015	PVP	Med-Late	MS	MS	MR	R
Jerry	ND	1994	PVP	Medium	MS	MS	MS	MS
MN Pearl	MN	2018	PVP	Late	MS	--	MS	R
Morton	ND	2001	PVP	Late	MS	--	MS	R
Natty	SD	2015	PVP	Medium	MR	MS	MR	R
Reins	IL	2016	PVP	Early	MR	MR	R	R
Rushmore	SD	2019	Pending	Medium	MR	--	MR	MR
Saber	IL	2010	PVP	Early	MS	S	MR	S
Saddle	SD	2018	Pending	Early	MR	S	MR	--
Shelby 427	SD	2011	PVP	Medium	MS	MS	MR	MR
Streakere	SD	2016	PVP	Medium	MS	--	MR	R
Sumo	SD	2017	PVP	Early	MR	R	MS	R
Warrior	SD	2019	Pending	Med-Late	R	--	MS	R

[a] Origin: IL-University of Illinois; MN-University of Minnesota; ND-North Dakota State University; SD-South Dakota State University; SW-Lantmannen Seed, Sweden; WI-University of Wisconsin.
[b] PVP = Plant Variety Protection. The PVP Act provides a certificate to the developer of a variety granting exclusive rights for reproducing and marketing the seed.
[c] Disease Ratings: S = susceptible; MS = moderately susceptible; MR = moderately resistant; R = resistant.
[d] Disease: BYDV = Barley Yellow Dwarf Virus.
[e] Hulless variety.

Oat management information is provided with the results from each location. No herbicides or insecticides were applied at any location.

Data were analyzed using JMP Pro 15 (SAS Institute Inc., Cary, NC). Statistical significance is determined at $P \leq 0.10$ level (unless otherwise noted) and means separations are reported using Tukey's least significant difference (LSD).

RESULTS AND DISCUSSION

Data were analyzed by location, and varieties are listed in order of yield performance at each location. Reported yields are corrected for 13% moisture. A "percentage of test average" calculation is included to aid in comparing varieties at each location. Rainfall and temperature data were accessed from the nearest weather station.[8] Rainfall in 2021 was well below historical averages, particularly at Boone and Nashua.

Streaker, a hulless variety, routinely yielded least but always scored the highest test weight at each location (>40 lb/bu). Five varieties at Kanawha and six varieties at Boone made a test weight of 38 lb/bu – the standard minimum that many food companies require before dockage is applied. A test weight of 36 lb/bu is a minimum processing facilities can use for food-grade milling and several varieties at each location made this test weight. The low number of varieties reaching food grade thresholds (38 lb/bu) in 2021 is likely, in part, due to the hot and dry June conditions at each site.

Lodging was highest at Greenfield which was harvested at least a week later than the rest of the sites. Across the three sites reporting incidence of lodging, Streaker appeared to be the most susceptible variety.

ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop:	Soybeans
Replications:	3
Harvested plot size:	5 ft × 46 ft
Fertilizer applied:	79 lb N/ac as urea on March 31
Tillage:	Soil finisher on March 31
Planting date:	Apr. 1, followed by cultipacker
Row spacing:	7.5 in.
Seeding rate:	4 bu/ac
Seeding depth:	1 in.
Harvest date:	July 21

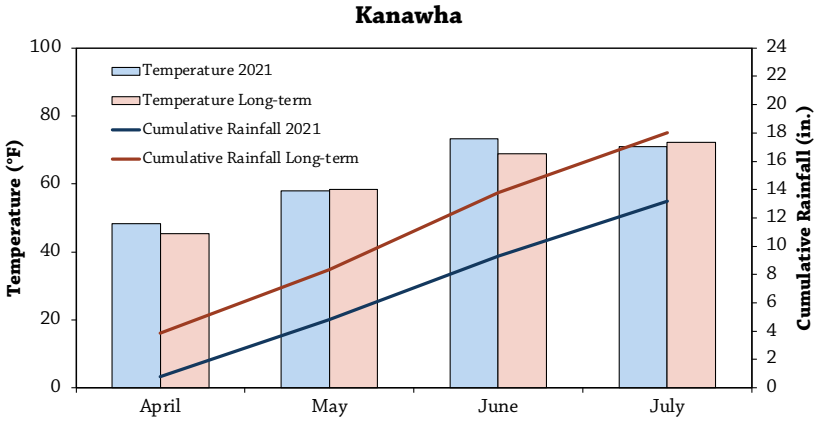

TABLE 2. Results for the 2021 Oat Variety Trial at Kanawha in north-central Iowa.
Varieties with a test weight that meets food grade specification (≥38 lb/bu) are highlighted.

	YIELD					
VARIETY	(bu/ac)	(% of site avg.)	7-yr avg. (bu/ac)	TEST WEIGHT (lb/bu)	PLANT HT AT HARVEST (in.)	LODGING (%)
Warrior	149	114	116	35.0	38	0
Saddle	145	111	111	35.5	37	0
MN Pearl	142	109	111	35.1	38	2
Esker2020	142	108	110	33.4	37	0
Saber	141	108	109	35.5	36	0
Rushmore	141	108	135	37.0	39	0
Natty	139	107	99	37.5	39	0
Deon	139	107	96	37.2	39	0
CS Camden	139	106	91	34.6	38	0
Hayden	137	105	95	37.1	38	2
Reins	135	104	92	37.7	31	0
Jerry	132	101	75	37.6	39	0
Shelby 427	131	100	88	38.7	40	0
Antigo	128	98	85	38.8	37	27
Goliath	116	89	86	38.0	44	38
Morton	110	85	107	35.9	40	0
Sumo	109	83	82	38.2	37	8
Streaker	74	57	81	45.1	38	35
MEAN	131	--	--	37.1	38	--
LSD (90%)	32	--	--	1.5	3	--

[a] By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.
[b] 7-yr. average yields are listed for varieties trialed at least twice in the past seven years at this location.

ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop:	Soybeans
Replications:	3
Harvested plot size:	5 ft × 51 ft
Fertilizer applied:	30 lb N/ac; 100 lb P/ac; 25 lb S/ac on Apr. 3
Tillage:	Field cultivator on Apr. 5
Planting date:	Apr. 5
Row spacing:	7.5 in.
Seeding rate:	4 bu/ac (3.5 bu/ac for Streaker only)
Seeding depth:	1 in.
Harvest date:	July 22

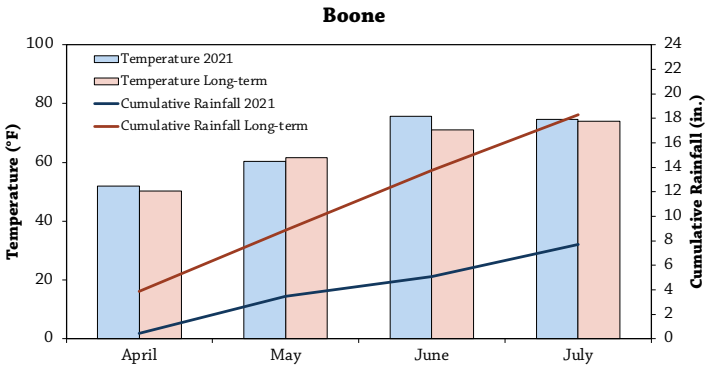

TABLE 3. Results for the 2021 Oat Variety Trial at Boone in central Iowa.
Varieties with a test weight that meets food grade specification (≥38 lb/bu) are highlighted.

	YIELD					
VARIETY	(bu/ac)	(% of site avg.)	4-yr avg. (bu/ac)	TEST WEIGHT (lb/bu)	PLANT HT AT HARVEST (in.)	LODGING (%)
Goliath	116	112	88	35.8	36	77
Jerry	114	110	77	37.1	33	28
Reins	113	108	96	38.1	25	0
Saddle	111	107	100	35.9	30	0
Warrior	111	107	104	36.3	30	0
CS Camden	111	107	89	31.4	30	2
Esker2020	110	106	104	34.2	31	3
Rushmore	110	106	121	38.3	33	8
Saber	107	103	94	35.1	31	13
Natty	106	102	86	37.4	23	15
MN Pearl	106	102	97	36.0	30	8
Shelby 427	103	99	81	38.2	33	2
Deon	103	99	90	36.7	32	7
Hayden	102	98	87	37.7	32	5
Morton	96	93	98	34.7	32	7
Sumo	92	88	82	38.1	30	7
Antigo	86	82	81	39.5	31	15
Streaker	72	69	79	45.9	33	50
MEAN	104	--	--	37.0	31	--
LSD (90%)	27	--	--	3.7	12	--

[a] By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.
[b] 4-yr. average yields are listed for varieties trialed at least twice in the past four years at this location.

ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop:	Soybeans
Replications:	3
Harvested plot size:	8 ft × 127 ft
Fertilizer applied:	14 lb N/ac, 66 lb P/ac as MAP on Nov. 13, 2020
	30 lb N/ac as urea on March 22, 2021
Tillage:	Field cultivator on March 22 and 29
Planting date:	March 30, followed by cultipacker
Row spacing:	7.5 in.
Seeding rate:	4 bu/ac
Seeding depth:	1 in.
Harvest date:	July 13

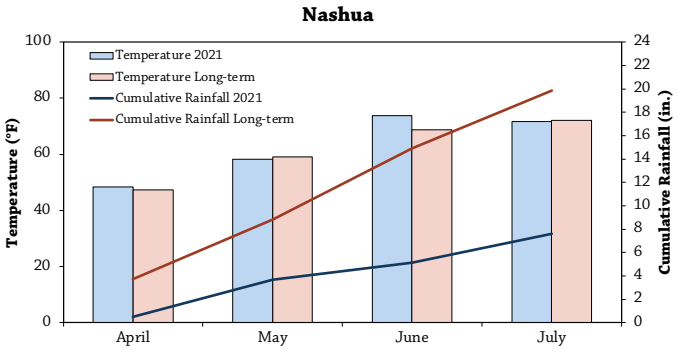

TABLE 4. Results for the 2021 Oat Variety Trial at Nashua in northeast Iowa.
Varieties with a test weight that meets food grade specification (≥38 lb/bu) are highlighted.

	YIELD					
VARIETY	(bu/ac)	(% of site avg.)	7-yr avg. (bu/ac)	TEST WEIGHT (lb/bu)	PLANT HT AT HARVEST (in.)	STRAW YIELD (ton/ac)
Saddle	131	108	127	33.4	31	1.46
Warrior	129	106	123	32.8	30	1.58
Shelby 427	129	106	115	36.3	33	1.60
Natty	127	105	124	34.8	34	1.36
Reins	127	105	118	34.8	26	1.16
Goliath	127	105	127	33.3	36	1.57
Saber	126	104	124	33.2	30	1.27
Hayden	125	103	129	34.6	31	1.57
Deon	124	102	124	34.2	32	1.57
Esker2020	123	102	131	30.3	31	1.36
Rushmore	121	100	132	33.7	32	1.44
CS Camden	121	100	109	30.8	29	1.44
Antigo	120	99	109	36.3	32	1.26
Morton	117	96	112	31.5	34	1.56
Jerry	117	96	109	34.4	33	1.43
MN Pearl	116	96	132	31.1	30	1.53
Sumo	114	94	110	36.1	32	1.16
Streaker	87	72	84	44.1	34	1.51
MEAN	121	--	--	34.2	32	1.43
LSD (90%)	12	--	--	0.4	2	0.03

[a] By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.
[b] 7-yr. average yields are listed for varieties trialed at least twice in the past seven years at this location.

ISU SOUTHWEST RESEARCH FARM, GREENFIELD

Previous crop:	Soybeans
Replications:	3
Harvested plot size:	5 ft × 56 ft
Fertilizer applied:	70 lb N/ac as urea on Apr. 1
Tillage:	Disked on Apr. 1
Planting date:	Apr. 5 followed by cultipacker
Row spacing:	7.5 in.
Seeding rate:	4 bu/ac (3.5 bu/ac for Streaker only)
Seeding depth:	1 in.
Harvest date:	July 28

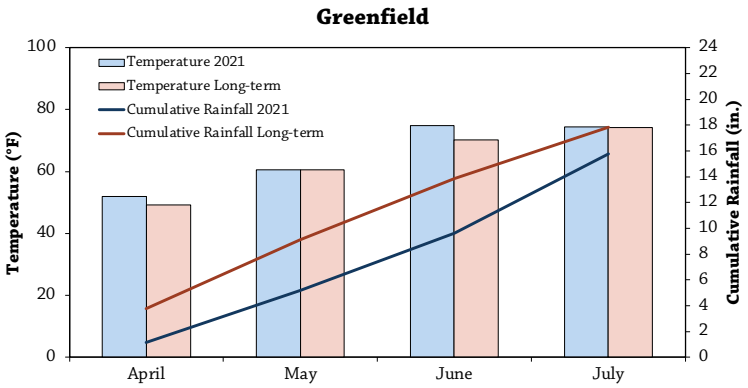

TABLE 5. Results for the 2021 Oat Variety Trial at Greenfield in southwest Iowa.
Varieties with a test weight that meets food grade specification (≥38 lb/bu) are highlighted.

	YIELD					
VARIETY	(bu/ac)	(% of site avg.)	2-yr avg. (bu/ac)	TEST WEIGHT (lb/bu)	PLANT HT AT HARVEST (in.)	LODGING (%)
Reins	145	136	134	35.8	30	22
Rushmore	134	125	141	35.3	36	37
Saddle	131	122	131	34.2	34	10
MN Pearl	128	120	135	33.8	35	33
Hayden	127	119	119	35.9	37	35
Saber	122	114	137	34.5	34	25
Esker2020	117	110	129	32.7	34	40
Warrior	113	106	117	32.0	35	17
Shelby 427	112	105	137	36.4	36	38
Sumo	105	98	61	34.9	35	30
Deon	102	96	113	32.8	36	42
Natty	99	93	121	34.2	37	30
CS Camden	96	90	96	30.5	36	28
Antigo	92	87	109	37.6	33	68
Morton	81	76	99	32.0	39	35
Goliath	77	73	83	34.5	41	77
Jerry	73	69	80	33.0	36	33
Streaker	64	60	126	45.4	34	43
MEAN	107	--	--	34.7	35	36
LSD (90%)	33	--	--	2.1	4	42

[a] By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.
[b] 2-yr. average yields are listed for varieties trialed in the past two years at this location.

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PRACTICAL FARMERS of Iowa

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